CLAIMS

1. An anode for a nonaqueous secondary battery comprising a pair of current collecting surface layers of which the surfaces are adapted to be brought into contact with an electrolytic solution and at least one active material layer interposed between the surface layers, the active material layer containing particles of an active material having high capability of forming a lithium compound.

2. The anode for a nonaqueous secondary battery according to claim 1, wherein the material making up the surfaces is present over the whole thickness of the active material layer to electrically connect the two surfaces so that the anode has a current collecting function as a whole.

3. The anode for a nonaqueous secondary battery according to claim 1, wherein the surface layers each have a thickness of 0.3 to 10 μm.

4. The anode for a nonaqueous secondary battery according to claim 1, wherein the surface layers are each comprise a metallic material having low capability of forming a lithium compound.

5. The anode for a nonaqueous secondary battery according to claim 1, wherein the surface layers each comprise copper, nickel, iron, cobalt or an alloy of these metals.

6. The anode for a nonaqueous secondary battery according to claim 1, wherein the surface layers are layers formed by electroplating.

7. The anode for a nonaqueous secondary battery according to claim 1, wherein the surface layers have a large number of microvoids extending in the thickness direction of the surface layers and allowing a nonaqueous electrolytic solution to penetrate therethrough.

8. The anode for a nonaqueous secondary battery according to claim 7, wherein in that the microvoids lead to the active material layer, the microvoids of at least one of the

surface layers have an average opening area of 0.1 to 50 μm^2 and an open area ratio of 0.1 to 20%, and the anode has no thick conductor for current collection.

9. The anode for a nonaqueous secondary battery according to claim 1, wherein the active material particles comprise particles of a silicon material or a tin material.

10. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are particles of single silicon or single tin.

11. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are mixed particles of at least single silicon or single tin and carbon, the mixed particles comprising 10 to 90% by weight of silicon or tin and 10 to 90% by weight of carbon.

12. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are mixed particles of silicon or tin and a metal, the mixed particles containing 30 to 99.9% by weight of silicon or tin and 0.1 to 70% by weight of at least one element selected from the group consisting of Cu, Ag, Li, Ni, Co, Fe, Cr, Zn, B, Al, Ge, Sn, Si, In, V, Ti, Y, Zr, Nb, Ta, W, La, Ce, Pr, Pd, and Nd, provided that Sn is excluded from the group where the particles contain tin and that Si is excluded from the group where the particles contain silicon.

13. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are particles of a silicon compound or a tin compound, the silicon compound particles or tin compound particles containing 30 to 99.9% by weight of silicon or tin and 0.1 to 70% by weight of at least one element selected from the group consisting of Cu, Ag, Li, Ni, Co, Fe, Cr, Zn, B, Al, Ge, Sn, Si, In, V, Ti, Y, Zr, Nb, Ta, W, La, Ce, Pr, Pd, and Nd, provided that Sn is excluded from the group where the particles contain tin and that Si is excluded from the group where the particles contain silicon.

14. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are mixed particles of silicon compound particles or tin

compound particles and metal particles,

the mixed particles containing 30 to 99.9% by weight of the silicon compound particles or tin compound particles and 0.1 to 70% by weight of particles of at least one element selected from the group consisting of Cu, Ag, Li, Ni, Co, Fe, Cr, Zn, B, Al, Ge, Sn, Si, In, V, Ti, Y, Zr, Nb, Ta, W, La, Ce, Pr, Pd, and Nd, provided that Sn is excluded from the group where the particles contain tin and that Si is excluded from the group where the particles contain silicon, and

the silicon compound particles or tin compound particles containing 30 to 99.9% by weight of silicon or tin and 0.1 to 70% by weight of at least one element selected from the group consisting of Cu, Ag, Li, Ni, Co, Fe, Cr, Zn, B, Al, Ge, Sn, Si, In, V, Ti, Y, Zr, Nb, Ta, W, La, Ce, Pr, Pd, and Nd, provided that Sn is excluded from the group where the particles contain tin and that Si is excluded from the group where the particles contain silicon.

15. The anode for a nonaqueous secondary battery according to claim 9, wherein the active material particles are metal-coated particles of single silicon or single tin, the metal being at least one element selected from the group consisting of Cu, Ag, Ni, Co, Fe, Cr, Zn, B, Al, Ge, Sn, Si, In, V, Ti, Y, Zr, Nb, Ta, W, La, Ce, Pr, Pd, and Nd, provided that Sn is excluded from the group where the particles contain tin and that Si is excluded from the group where the particles contain silicon, and the particles containing 30 to 99.9% by weight of silicon or tin and 0.1 to 70% by weight of the metal.

16. The anode for a nonaqueous secondary battery according to claim 1, wherein the active material particles contain silicon, have an average particle diameter (D_{50}) of 0.1 to 10 μm, and have an oxygen concentration of less than 2.5% by weight, and the silicon concentration in the outermost surface of the particles is higher than 1/2 of the oxygen concentration in the outermost surface of the particles.

17. The anode for a nonaqueous secondary battery according to claim 1, wherein the active material particles have a maximum particle size of 50 μm or smaller.

18. The anode for a nonaqueous secondary battery according to claim 1, wherein the active material layer is a layer formed by applying an electrically conductive slurry containing the active material particles.

19. The anode for a nonaqueous secondary battery according to claim 1, which has no electrically conductive metal foil layers as a core in the middle of the thickness thereof and has a total thickness of 2 to 50 μm.

20. The anode for a nonaqueous secondary battery according to claim 1, which has an electrically conductive metal foil layer as a core in the middle of the thickness thereof, the active material layer formed on both sides of the metal foil layer, and the current collecting surface layers covering the respective active material layers, and has a total thickness of 10 to 100 μm.

21. A process of producing an anode for a nonaqueous secondary battery, which is a process of producing the anode for a nonaqueous secondary battery according to claim 1, comprising:

applying an electrically conductive slurry containing active material particles on a carrier foil to form an active material layer,

immersing the carrier foil having the active material layer formed thereon in a plating bath containing a metallic material to conduct electroplating to form an electrode containing the active material layer, and

separating the electrode from the carrier foil.

22. The process for producing an anode for a nonaqueous secondary battery according to claim 21, which comprises electroplating the carrier foil with a metallic material having low capability of forming a lithium compound to form a first current collecting surface layer before the formation of the active material layer, forming the active material layer on the first current collecting surface layer, electroplating the active material layer with a metallic material having low capability of forming a lithium compound to form a second current collecting surface layer, and separating the carrier foil from the first current collecting surface layer.

23. The process for producing an anode for a nonaqueous secondary battery according to claim 22, wherein a coat made of a material different from the material of the first current collecting surface layer is formed on the carrier foil to a thickness of 0.001 to 1 μm before the formation of the first current collecting surface layer, and the material of the first current collecting surface layer is electrodeposited on the carrier foil

having the coat by electroplating to form the first current collecting surface layer.

24. A process of producing an anode for a nonaqueous secondary battery, which is a process of producing the anode for a nonaqueous secondary battery according to claim 1, comprising:

treating a carrier resin having a large number of cation exchange groups on the surface thereof with a metal ion-containing solution to form a metal salt of the cation exchange groups,

reducing the metal salt to form on the surface of the carrier resin a coating film of the metal serving as a catalyst nucleus,

electroplating the coating film with a metallic material having low capability of forming a lithium compound to form a first current collecting surface layer,

applying an electrically conductive slurry containing active material particles to the first current collecting surface layer to form an active material layer,

electroplating the active material layer with a metallic material having low capability of forming a lithium compound to form a second current collecting surface, and

separating the carrier resin from the first current collecting surface layer by peeling or dissolution.

25. A process of producing an anode for a nonaqueous secondary battery, which is a process of producing the anode for a nonaqueous secondary battery according to claim 20, comprising:

applying an electrically conductive slurry containing active material particles to each side of an electrically conductive metal foil to form active material layers,

immersing the electrically conductive metal foil having the active material layers formed thereon in a plating bath containing a metallic material having low capability of forming a lithium compound to conduct electroplating.

26. A nonaqueous secondary battery having the anode for a nonaqueous secondary battery according to claim 1.